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Space weathering of rocks

Space weathering discussions have generally centered around soils but exposed rocks will also incur the effects of weathering. On the Moon, rocks make up only a very small percentage of the exposed surface and areas where rocks are exposed, like central peaks, are often among the least space weathered regions we find in remote sensing data. However, our studies of weathered Ap 17 rocks 76015 and 76237 show that significant amounts of weathering products can build up on rock surfaces. Because rocks have much longer surface lifetimes than an individual soil grain, and thus record a longer history of exposure, we can study these products to gain a deeper perspective on the weathering process and better assess the relative importance of various weathering components on the Moon.

In contrast to the lunar case, on small asteroids, like Itokawa, rocks make up a large fraction of the exposed surface. Results from the Hayabusa spacecraft at Itokawa suggest that while the low gravity does not allow for the development of a mature regolith, weathering patinas can and do develop on rock surfaces, in fact, the rocky surfaces were seen to be darker and appear spectrally more weathered than regions with finer materials. To explore how weathering of asteroidal rocks may differ from lunar, a set of ordinary chondrite meteorites (H, L, and LL) which have been subjected to artificial space weathering by nanopulse laser were examined by TEM. NpFe^0 -bearing glasses were ubiquitous in both the naturally-weathered lunar and the artificially-weathered meteorite samples.